

# Science to Action

## **Community-based Participatory Research and Cumulative Risk Analysis as Tools to Advance Environmental Justice**

EPA New England, EPA-ORD, BU School of Public Health  
Boston, MA  
May, 2004

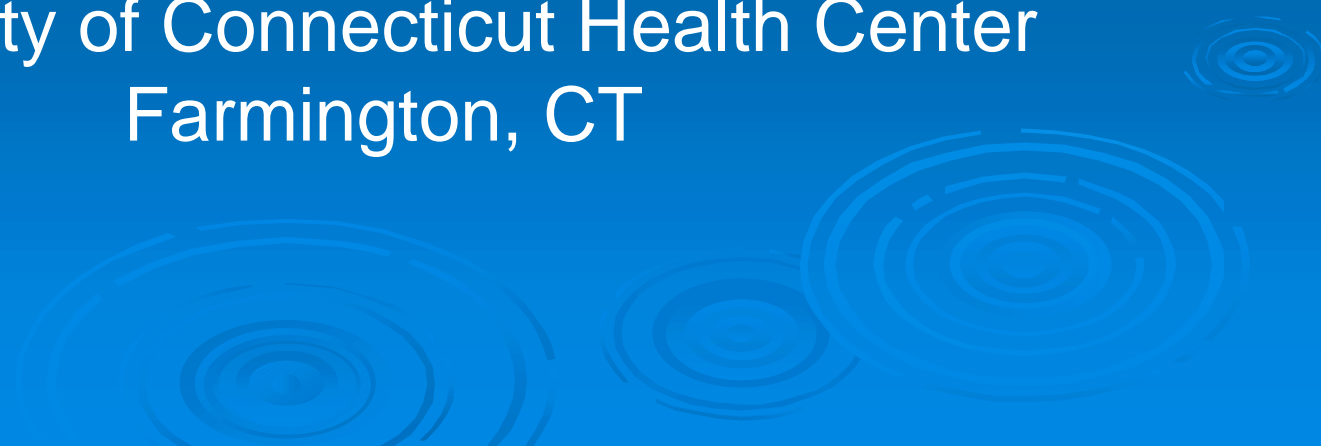


UConn  
Health Center

# Schools and Asthma

## Opportunities for Disease Tracking and Prevention

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# Schools

- Community based health tracking
- Environments of interest
- Opportunities for
  - Prevention
  - Disease detection
  - Treatment

# Schools and Asthma

- Clinical experience
- Sentinel cases of asthma in teachers
- Chart review
- Pilot study of teachers in Connecticut
- Study of asthma prevalence in CT school children

# Clinical Experience at UCHC

- Highlights from a Chart Review at UCHC
- 55 educators from 27 schools
- Self or physician-referred to the Division of Occupational and Environmental Medicine at UConn
- 1994-2001

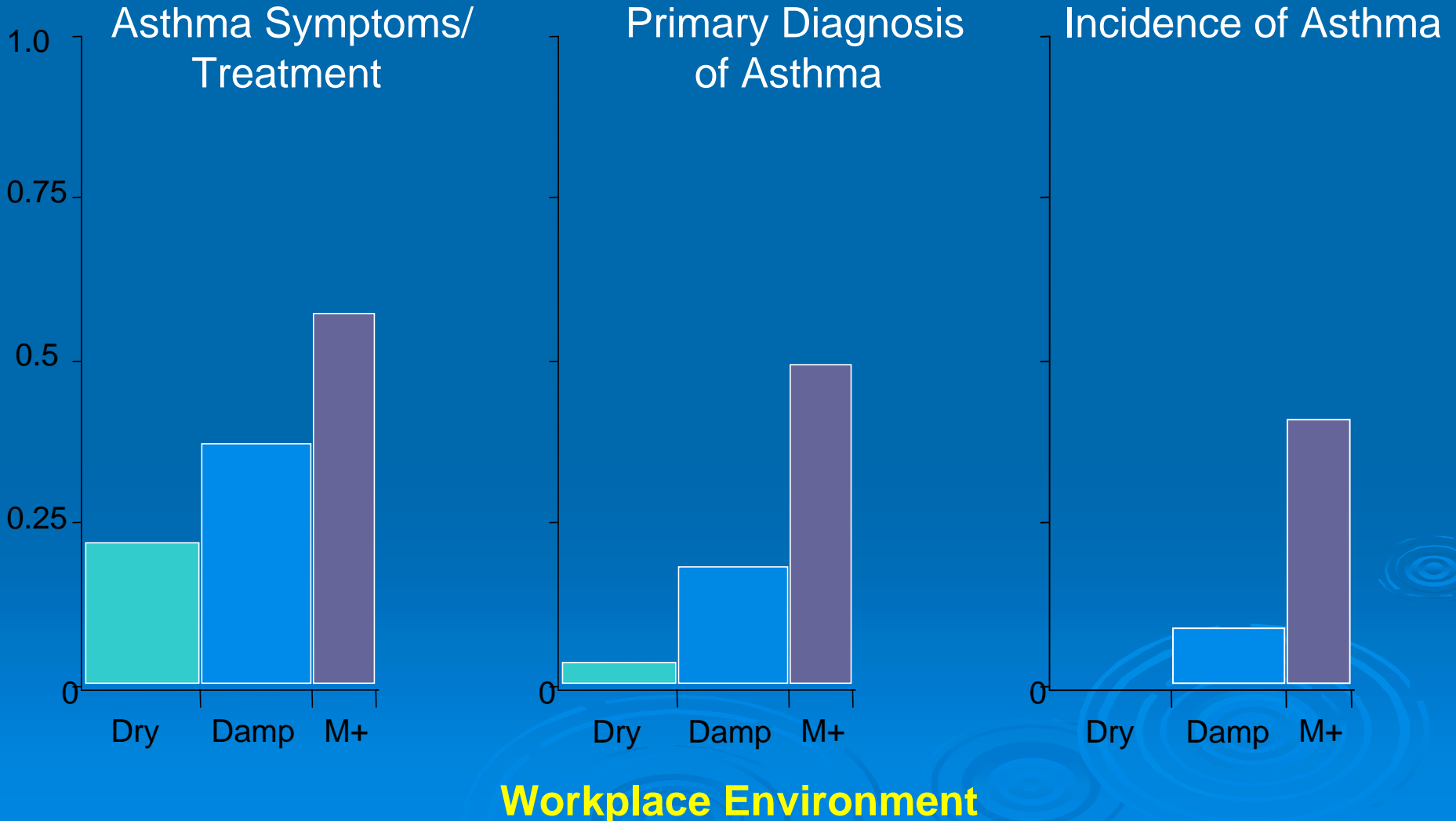
# Information Available for Review

- Medical history and physical examination
- Lung function testing
- X-ray studies
- Site visit reports for classrooms and/or schools – for 41/55 patients


# Environments of Patients

- 22 in schools with no evidence of water incursion or mold growth
- 21 in schools with visible water damage
- 12 in schools with moisture incursion and visible mold growth indoors

## Summary: Asthma symptoms and incidence as a function of workplace environment in educators



# Pilot Survey of Teachers with CEA

- 3 districts of different size and type
  - 1825 eligible teachers
  - 717 respondents (39%)
  - Outreach in April, 2003
  - Questionnaires distributed in several ways
  - Confidential return mechanisms
- 

# Surveys were returned from 35 schools

	Response rate	Range
District A	75%	49 to 100%
District B	50%	34 to 83%
District C	32%	0 to 91%

## SUMMARY DATA (n=717)


**Non-Asthmatic**  
**593**

**Dx w/ Asthma**  
**125 (17%)**

<b>% Female:</b>	<b>82.7%</b>	<b>85.0%</b>
<b>Age (yrs):</b>	<b>45.1</b>	<b>42.5</b>
<b>Teaching (yrs):</b>	<b>15.3</b>	<b>12.8</b>
<b>Sinus problems in past year:</b>	<b>66.7%</b>	<b>83.0%</b>
<b>Recurrent Bronchitis</b>	<b>12%</b>	<b>37%</b>
<b>Hayfever</b>	<b>21%</b>	<b>49%</b>

--About half of the asthmatics reported that their symptoms were better on vacations or long weekends.

--172 (29%) of the non-asthmatics reported a history of wheezing. Most of these (about 60% of those with wheezing) reported that their wheezing had been worse at work than at home.



## District-to-district Variation in Asthma:

If we subgroup the asthma patients according to school district, the estimated ranges varied somewhat from location to location (with the highest rates in the small town and lowest in the urban district, contrary to expectations):

	<u>District A</u>	<u>District B</u>	<u>District C</u>
+PMH Asthma	26%	20%	15%
+Current Asthma	17%	16%	12%

## Environmental risk factors:

- Higher percentages of asthmatics vs. non-asthmatics reported presence of dampness in their workplaces (52% vs. 46%, respectively) and homes (30% vs. 13%).
- There were no differences in pet ownership, or perceived exposure to mold or cockroaches (at work or at home) between the asthmatics and non-asthmatics.

## New Onset (Incident) Asthma:

The survey also allowed us to identify **when** the teachers with asthma reported having been diagnosed with the disease:

The teachers reported 3-10 cases of new onset asthma/year between 1990 and 2003.

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There were an average of  $5.6 \pm 2.2$  new cases/yr in our sample averaged over the 14 years (1990-2003).

This represents an estimated incidence of:

7.8 cases/1000/year.

and is above the “expected” rate estimated to be:

1-4 cases/1000/year.

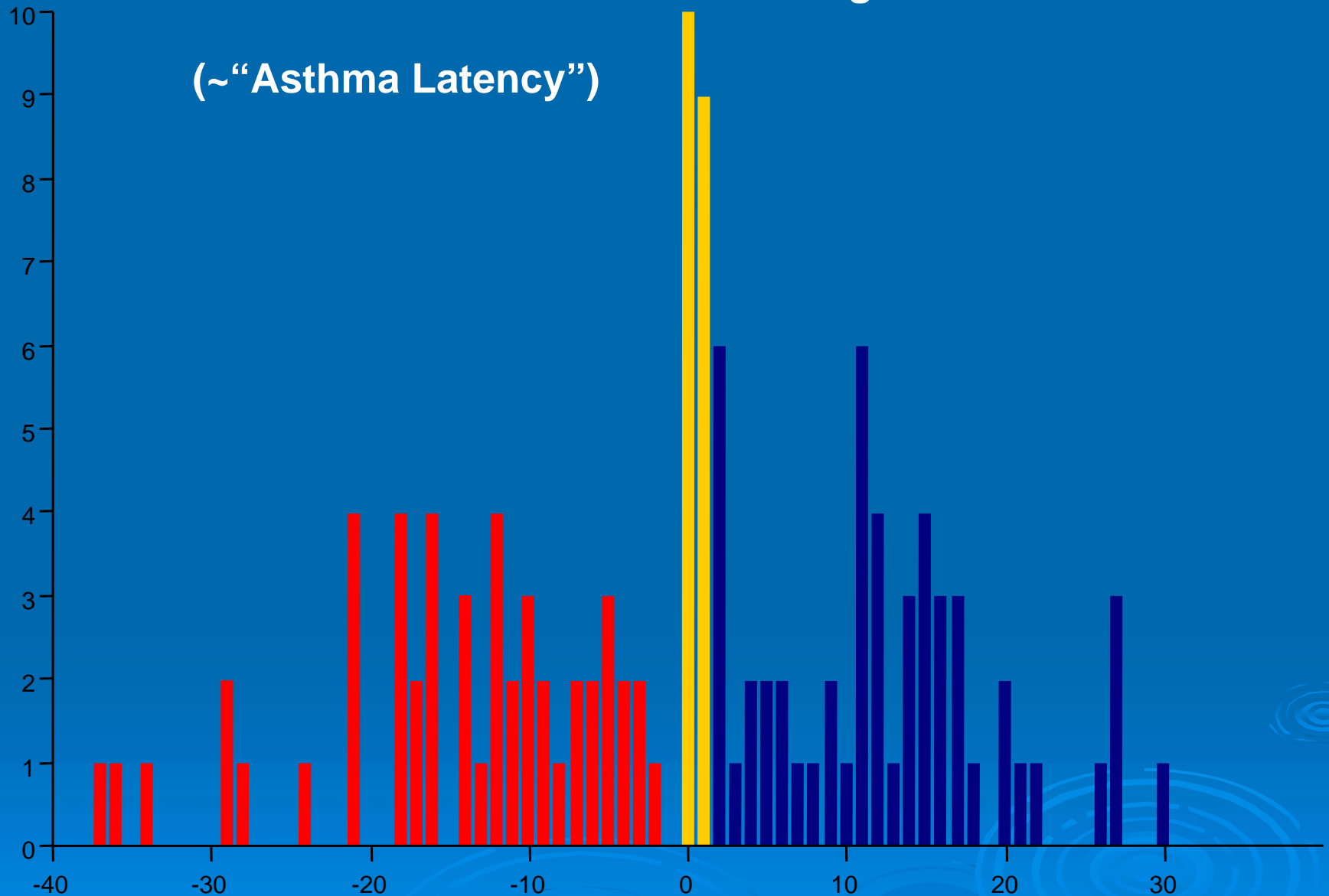
There appeared to be an excess number of cases diagnosed during the first 2-3 years of teaching, reflecting about 14 cases/1000/yr during those first two years.

Estimated incidence rates subsequently fell toward 2-3 cases/1000/year.



# Incident asthma vs. Years of Teaching

(~“Asthma Latency”)



Years: -37 to -1 prior to teaching

Teaching Years: 0-30.....

# Conclusions

- Teachers in Connecticut have relatively high incidence and prevalence rates of asthma
- The incidence of asthma is highest within the first two years of the start of their teaching careers
- The pattern of symptoms supports an occupational component in teachers' asthma.

# Asthma Prevalence in Elementary School Children in CT

- Study conducted by Environment and Human Health, Inc
- Full report at [www.ehhi.org](http://www.ehhi.org)
- Co-investigators
  - Mark Cullen, MD
  - Nadine Schwab, RN, MPH, PNP
  - Nancy Alderman, MES
- Funded by the CDC

# Methods

- Outreach to school nurse supervisors
- Questionnaire for each school nurse in district
- Analysis of asthma rates by urbanicity and socioeconomic characteristics of schools
- Analysis of school risk factors
- Nested case-control study of schools with high and low rates of asthma within districts

**Participation of grades K-5 in CT Public Schools and Private non-profit Schools that receive health services from the public school programs**

	<b>Connecticut Number</b>	<b>Participating Schools Number (%)</b>
Districts	158	134 (85%)
Schools	863	698 (81%)
Public	685	562 (82%)
Private	178	132 (74%)
Children*	290,412	236,471 (81%)

\*Estimate based on grades  
K-5 during the 2002-2003  
school year

## Asthma Prevalence in CT Grades K-5

	Participating Schools	Asthma Prevalence Rate		
		Mean	10 <sup>th</sup>	90 <sup>th</sup>
		Percentiles		
All Schools	698	9.8	4.9	15.4

# Urbanicity

Urbanicity	Participating Schools (n=698)	Asthma Prevalence Rate		
		Mean	10 <sup>th</sup> Percentiles	90 <sup>th</sup>
rural	56	8.8	4.5	13.7
suburban	371	9.0	4.6	13.7
small urban	174	10.1	5.2	16.5
large city	96	13.1	6.2	22.9

# Education Reference Groups

Socioeconomic (ERG)	Participating Schools (n=698)	Asthma Prevalence Rate		
		Mean	10 <sup>th</sup>	90 <sup>th</sup>
		Percentiles		

A	47	6.7	3.7	10.9
B	72	8.7	5.1	12.9
C	49	8.5	4.0	14.0
D	95	9.1	5.7	13.0
E	24	9.4	5.0	14.0
F	112	9.9	5.2	14.8
G	36	10.4	5.4	15.5
H	110	9.5	5.3	14.6
I	153	12.2	5.0	19.8

<b>Environmental Characteristics</b>	<b>Participating Schools % (n=698)</b>	<b>Rural % (n=56)</b>	<b>Suburban % (n=371)</b>	<b>Small % Urban (n=174)</b>	<b>Large City % (n=96)</b>
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## Location

into or below hill	17	21	18	18	11
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damp or marsh land	31	38	33	31	23
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Roof flat	67	46	70	68	66
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History of roof leaks (>1)	50	52	50	52	39
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Carpets – all rooms	24	30	28	22	13
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Environmental Characteristics	Participating Schools % (n=698)	Rural % (n=56)	Suburban % (n=371)	Small % Urban (n=174)	Large City % (n=96)
<b>Cockroaches</b>	<b>7</b>	<b>0</b>	<b>0.5</b>	<b>15</b>	<b>21</b>
<b>Rodents</b>	<b>17</b>	<b>16</b>	<b>13</b>	<b>15</b>	<b>32</b>
<b>Children present with renovations</b>	<b>18</b>	<b>11</b>	<b>19</b>	<b>13</b>	<b>28</b>
<b>Buses idling</b>	<b>55</b>	<b>38</b>	<b>52</b>	<b>61</b>	<b>66</b>

\*Urbanicity: rural (population of less than 5000);suburban (5000-49,999);small urban (50,000-119,999); large city ( $\geq$ 120,000).

## Environmental characteristics of schools with the highest asthma rates and control schools.

Environmental Characteristics	Case Schools* (n=70)	Control Schools** (n=70)	Chi-squared P value
Location into or below hill	19%	11%	0.24
On Damp or Marsh Land	24%	27%	0.69
Roof Flat	71%	59%	0.11
Roof leaks-2 or more	59%	44%	0.05
Carpets in all Classrooms	26%	11%	0.03
Cockroaches	20%	14%	0.34
Rodents	29%	23%	0.35
Renovations with children present	49	39	0.41
Buses Idling	60%	61%	0.86

\*Case schools represent 10% of schools with the highest rates of asthma. (90<sup>th</sup> percentile)

\*\*Control schools were selected according to the following criteria: 1) same district or another school district from the same size in the same county and in the same ERG and 2) asthma rate below the 90<sup>th</sup> percentile

# Value of Community-based Research

- Involvement of community in defining environmental risks of concern
- Involvement of community in defining health outcomes of concern
- Ownership of results – particularly when intervention suggested requires action by participants

# Research Needs

- Health tracking – community level data regarding asthma
- Impact of primary prevention on incidence
- Impact of building level intervention on severity, persistence of asthma
  - Homes
  - Schools
  - Daycare

# Acknowledgments

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# Acknowledgments

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CT Department of Public Health

CT Department of Labor

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